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THE OBSERVER AS REPORTER: A SURVEY OF THE 'PSYCHOLOGY OF TESTIMONY.'[1]

BY DR. GUY MONTROSE WHIPPLE,

Cornell University.

To the individual who, in psychological experimentation, submits himself to a given experience and renders us an account of it, we apply the name *observer*. The observer's account will commonly assume linguistic form. Although language is in the main a flexible, delicate, accurate, and easy means of communicating ideas, yet the observer's account can never do justice to the continuity, complexity, and delicacy of shading of his mental experience, however much we refine our terminology and train our observer. And all too often we fail to realize the inadequacy of verbal expression to the experience which is being described. We fail to keep in mind that the observer not only observes, but that he also reports, and that it is not only possible, but practically certain, that the report is only a partial and often a misleading statement of the real experience.

If, then, the work of reporting is difficult even for the trained expert working under laboratory conditions and using a carefully refined terminology, how much more difficult must it be for the untrained individual to report with accuracy and completeness the experiences of his daily life, when to the inadequacy of his language there must be added the falsifying influences of misdirected attention, mal-observation, and errors of memory, not to mention the falsifying influences that may spring from lack of caution, of zeal for accurate statement, or even from deliberate intent to mislead.

The idea that the capacity for report should itself be a subject for

[1] This paper was presented in condensed form before the American Psychological Association, at Baltimore, Md., December 31, 1908.

special experimental investigation seems first to have been definitely proposed by Binet in his book *La Suggestibilité* (1900), in which he calls attention to 'the advantage that would accrue from the creation of a practical science of testimony,' and expresses his conviction that this science is too important by far for its organization to be long delayed.[1]

While Binet's suggestion sprang from the fruits of psychological investigation, it is to be noted that it was directed toward the practical ends to be attained, particularly in jurisprudence. From this practical point of view has arisen also the interest in the psychology of testimony of certain jurists, notably Professor Hans Gross, of Prague,[2] who has done pioneer work in this field.

The psychology of report has found its most enthusiastic and active expositor in Stern, of Breslau, whose *Zur Psychologie der Aussage: experimentelle Untersuchungen über Erinnerungstreue*[3] was the direct stimulus to the appearance of numerous other contributions and in whose periodicals[4] practically all of these and subsequent contributions have, directly or indirectly, appeared. The fact that English and American investigators are conspicuous by their absence may be sufficient excuse for the present paper, which aims not to present anything new in this field, but to stimulate interest in the problems under discussion.

Problems.

The first problem of the psychology of report is in essence this: given a person who has had a certain experience, to study his report of that experience, and especially to analyze all the factors that may condition the fulness and accuracy of the report. When this 'appreciation' of testimony has been secured, there appears a second main problem, viz., the construction of a normative science of report, *i. e.*, the determination of rules for the evaluation of reports given under any specified conditions,[5] and the recommendation of methods for training

[1] Work that might now be classed as psychology of the report had, of course, been done prior to this time, *e. g.*, Binet's and Miss Bryant's description-tests and many phases of the experimental investigation of observation, tachistoscopy, and memory.

[2] Author of *Kriminalpsychologie*, 1st edition, 1897, and o a *Handbuch für Untersuchungsrichter*, and editor of the *Archiv f. Kriminalanthropologie*.

[3] In the *Zeits. f. d. ges. Strafrechtswissenschaft*, 1902, also published separately, Berlin, 1902.

[4] *Beiträge zur Psychologie der Aussage*, 1903–7, enlarged in 1907 into the *Zeits. f. angewandte Psychologie*.

[5] It has been shown already that the scientific study of testimony can suggest important modifications in legal procedure: methods can be prescribed for the

in fidelity of observation and report. The numerous specific problems which are embraced in the main problems just mentioned relate to such issues as the dependence of the report upon the age, sex, mental ability, etc., of the reporter, the effect of bias, prejudice, of his familiarity or unfamiliarity with the occurrence under description, of the form of report, of the time that has elapsed since the event, etc. The more important of these special problems are discussed in the following sections.

Methods.

There are in general two methods of studying report: first, what might be termed the historical method (Larguier's method of observation, Stern's casuistical method); second, the experimental method.

The historical method consists in the critical examination of typical instances of report as found in various records, particularly in history and jurisprudence, *e. g.*, an analysis of the conflicting accounts of an historic battle, of the testimony of witnesses in criminal trials, of the work of newspaper reporters, etc. This method is less promising than the second, and I forbear to consider it further.

The experimental method possesses the obvious advantages of standardization of conditions, control of the determining factors, possibility of repetition and of quantitative and statistical evaluation of the results. But the method has been criticized, particularly by jurists, on the ground of over-simplification, general artificiality and consequent non-applicability to the problems of real life — criticism which is, I think, entirely intelligible, however incorrect.[1]

Within the experimental method, there are a number of specific methodological problems to which I now direct attention.

1. *The Choice of Material.* — The prime requisite here is the selection of material that shall admit of exact and detailed comparison with the report. This requisite has been a chief factor in the choice of the *picture-test*[2] — a test which has the additional merit of being inexpensive, easily procured, easily administered, readily duplicated

avoidance of unfavorable conditions in the taking of testimony: possibly in time there may be developed a satisfactory series of diagnostic tests for estimating the reliability of witnesses, or there may appear psychological experts whose opinions may be sought in consultation.

[1] There are signs, especially in Germany, of a better appreciation by the jurists of the work of the laboratory experts: so far as I know the epithet 'yellow psychologist' has not been applied as yet to any German investigator, as it has been to a well-known psychologist in this country.

[2] As in the work of Binet, Stern, Wreschner, Lobsien, Borst, Minnemann, de Placzek and others. The geometrical figures and drawings of objects used by Lobsien, Minnemann and others might be included here.

and repeated, of affording experiences of varied types and varied complexity, and of providing a situation not wholly unlike that of everyday life. The test has been criticized, *e.g.*, by Gross and by Jaffa, as artificial and too unlike the type of situations with which legal testimony has to deal, but this criticism has more theoretical than practical validity, because experiment has shown that the inferences drawn from the picture-test have, as a matter of fact, the general validity that is claimed for them.

This criticism has also been met by the actual use of *event-tests* in which opportunity is supplied for report upon human activities under realistic conditions. A typical illustration is afforded in the prearranged fictitious, but carefully enacted attempt at murder in the seminary of V. Liszt at Berlin.[1]

The *rumor-test* is arranged to compare hear-say evidence with the reports of eye-witnesses.

Other forms of material have had less extended use, *e. g.*, the description of known objects from memory (Stern, Lipmann, Gross), the reproduction of texts read aloud (Binet and Henri, Stern, Minnemann, de Placzek), the estimation of time-intervals and spatial dimensions, present or past (Stern), or the report of simple acts performed by the experimenter before the observers (Gross, Münsterberg).

2. *The Choice of Exposure-time.* — For events or texts, the duration of the original experience is obviously self-regulated: for pictures, times ranging from 5 sec. to 7 min. have been employed, though 45 to 60 sec. is most usual. It is to be desired that experiments, analogous to those on memory, should be undertaken to determine more carefully the effect upon the report of different exposure-periods. At present we know little about optimal exposure: in practice the time may be determined most satisfactorily by preliminary tests which show how long a period is necessary to permit an average person to examine each detail of the picture once.

3. *The Choice of Time-interval.* — Between experience and report any desired time may elapse: tests have been made for intervals of from nothing to nine and a half weeks. Here again is an inviting field for study of the effect of time-interval upon fulness and fidelity of report: investigations heretofore have been unfortunately complicated by the introduction of one or more reports during the interval.

4. *The Choice of Form of Report.* — There are two distinct

[1] Less elaborate event-tests have been made by Lipmann, Minnemann, Stern, Weber, and de Placzek. Lobsien took his pupils to witness an act of Minna von Barnhelm ; Stern has suggested the use of the moving-picture show in this connection.

forms of report, (1) the 'narrative'[1] (*Bericht, récit*), (2) the 'interrogatory' (*Verhör* of Stern, *Prüfung* of Wreschner, *interrogatoire* of Borst, *forçage de mémoire* of Binet). The narrative is a free account, delivered by the reporter, either orally or in writing, without comment, question, or suggestion by the experimenter: the interrogatory is a series of prearranged questions: the replies to these questions constitute the 'deposition' (*Verhörsprodukt*).[2] The constituent parts of narrative and deposition may be termed 'statements' or 'items.'

These two forms of report are psychologically dissimilar. The narrative has the advantage of freedom from suggestion, of spontaneity and individuality; but it has, as Wreschner has shown, the disadvantage of difficulty in precise statistical treatment, since the omission of a given item is equivocal (because we cannot tell why the reporter failed to mention it). If, however, as is the custom of nearly every experimenter at present, we supplement narrative by interrogatory, we gain the advantages and avoid the disadvantages of both forms of report.

5. *The Choice of Form of Interrogatory.* — An 'incomplete' interrogatory contains questions that refer only to those items not mentioned by the reporter in his narrative: a 'complete' interrogatory contains an exhaustive series of questions that cover every feature of the experience and that are propounded to all reporters in the same order and manner, — save for such minor modifications as individual replies most occasionally demand.[3] The number of questions for a single test ranges from 15 to 100; commonly about 50 are employed.

6. *The Choice of Questions.* — Since the form of questioning may materially influence the reporter's deposition, it happens that, in the study of testimony by the interrogatory, the interrogatory itself has become an object of study, with special reference, naturally, to the effect of leading or suggestive questions.

[1] It has been necessary for me to construct an English terminology for the *Aussage* psychology, since its technique has been developed in Germany and France and has never been carried over into equivalent English, so far as I am aware. An inspection of the foreign terms in use will show that they have not been selected with particular care. In selecting English equivalents, especially for the coefficents of report, I have tried to avoid conflict with established legal usage and at the same time to produce a terminology that shall be both consistent and descriptive. The French or German equivalents have been indicated for all the important terms.

[2] This is not in strict accord with legal usage, since a deposition might be in narrative form, yet, as distinguished from an affidavit, a deposition implies testimony that is made under interrogation and subject to cross-examination, and in this sense the term may be employed to indicate the result of the interrogatory.

[3] For this reason the best results are secured by individual examination with oral questions and answers, and stenographic record of every reply.

Stern has proposed a classification of questions, which, though perhaps only approximate, may serve to illustrate the importance of care in framing the interrogatory. He distinguishes six types of questions, viz., determinative, completely disjunctive, incompletely disjunctive, expectative, implicative, and consecutive. In illustration, suppose that the stimulus was a picture in which there was a dog, but no cat: on this basis, examples of the six types might be framed as follows:

A *determinative* question is one that is introduced by a pronoun or interrogative adverb, and is the least suggestive form of question, *e. g.*, "What color is the dog?"

A *completely disjunctive* question is one that forces the reporter to choose between two specified alternatives, *e. g.*, "Is there a dog in the picture?"

An *incompletely disjunctive* question is one that offers the reporter a choice between two alternatives, but does not entirely preclude a third possibility, *e. g.*, "Is the dog white or black?" In practice, for many reporters, especially for children, this form is virtually completely disjunctive, since a certain amount of independence is demanded for the choice of the third possibility, *e. g.*, for the answer "The dog is brown."

An *expectative* question is one that arouses a moderately strong suggestion of the answer, *e. g.*, "Was there not a dog in the picture?" (This is the form used by Binet to induce moderate suggestion.)

An *implicative* question is one that assumes or at least implies the presence of a feature that was not really present in the experience, *e. g.*, "What color is the cat?" In practice, it is clear that a determinative question might become implicative if the reporter had completely forgotten the item to which it referred. (The implicative question was used by Binet to induce strong suggestion.)

The *consecutive* question is any form of question that is used to augment a suggestion that has been developed by previous questions.

7. *The Choice of the Method of Grading Reports.* — In securing numerical expression of the adequacy of reports the chief problem is: what is the best method of translating the degree of correspondence between experience and report into quantitative terms? A second problem is: what attributes of the reporter's work are important enough to be symbolized as indices or coefficients of report?

In general, the adequacy of a report depends both upon its quantity and its quality: quantity is measured by the number of items mentioned or the number of questions answered (in absolute or in relative terms) and is referred to as the range of report (*Umfang*, *étendue*): quality is measured by the fidelity of the statements made, and is referred to as the accuracy of report (*Treue*, *fidélité*).[1]

For statistical work, attention must also be given to the degree of assurance or the positiveness or certainty with which the reporter makes his replies. Experience has shown that it is feasible and psycho-

[1] Accuracy seems, on the whole, a more feasible term than fidelity or exactitude, though fidelity has the advantage of subjective reference.

logically justifiable to differentiate, beside complete uncertainty (as indicated by the answer "I don't know" or "I have forgotten"), three degrees of assurance, viz., (1) hesitancy ("I think" or "I believe"), (2) certainty or assurance of ordinary degree, *i. e.*, positive assertion, and (3) attestation or attestable assurance, *i. e.*, the highest degree of assurance, as indicated by the willingness of the reporter to take his oath that the statement is correct.[1]

The computation of the several coefficients of report may now be based upon these values in accordance with a number of simple formulas.

COEFFICIENTS OF REPORT.

Let
P = number of possible items,
n = number of items reported (or replies made),
c = number of items reported with certainty (including attestation),
a = number of items whose correctness is attested under oath,
$n(N)$ = number of items reported in the narrative,
$n(D)$ = number of items reported in the deposition,
$n(r)$ = number of items that are rightly reported,
$c(r)$ = number of items that are certain and right,
$a(r)$ = number of items that are attested and right,
$a(w)$ = number of items that are attested and wrong,

Then
(1) n = range of report, absolute (*Umfang, étendue*),
(2) n/P = range of report, relative,
(3) $n(N)/n(D)$ = spontaneity of report,
(4) $n(r)/n$ = range of knowledge (*Umfang des Wissens, étendue du savoir*),
(5) $n(r)/c$ = accuracy of report (*Treue, fidélité*),
(6) c/n = assurance (*subjective Sicherheit, assurance*),
(7) $r)/c$ = reliability of assurance (*Zuverlässigkeit der Sicherheit, Sicherheitsberechtigung, fidélité de la certitude*),
(8) $c(r)/n$ = warranted assurance (*Sicherheit der Person, assurance justifiée*),
(9) $c(r)/n(r)$ = accuracy of assurance (*justesse certifiée*),

[1] In practice, sworn statements are commonly recorded by asking the reporter to underline the portions of his testimony to the correctness of which he would be willing to swear if under oath.

(10) a/n = tendency to oath or attestable assurance (*tendance au serment*),

(11) $a(r)/n$ = warranted tendency to oath (*tendance au serment véridique*),

(12) $a(w)/n$ = unwarranted tendency to oath (*tendance au faux-témoignage*),

(13) $a(r)/a$ = reliability of oath (*fidélité du serment*),

(14) $a(w)/a$ = unreliability of oath (*infidélité du serment*).

Note. — The fourth formula is used by many writers in place of the fifth for accuracy of report; as here indicated, however, the indeterminate cases ("I don't know") are omitted from the denominator in computing accuracy.

Next to range and accuracy the most important coefficient is probably warranted assurance (8th formula), as a high ratio indicates a good witness who reports a large number of items both correctly and with assurance. It is unfortunate that only a few investigators have taken pains to collect data with regard to the factors of certainty, assurance, etc., for this is, psychologically, a most promising phase of the work.

But the method of grading is not entirely settled with the determination of these formulæ, since diversity of opinion has arisen with regard to their application.

In illustration, the determination of P, and hence of relative range of report, raises the question: how many 'mental units' does the experience contain? In a picture-test, for example, is it adequate to report 'a man,' or should the reporter be expected to state the color of his coat, his stature, his complexion, his facial expression, the form of his collar, or the number of buttons on his vest? We must evidently avoid psychological atomism. The most practical working rule is to call 'one item' any combination of features that forms a single natural working group, the details of which would escape individual observation under ordinary conditions.

In further illustration, the computation and grading of errors raises the question: are all errors equivalent, or should they at least be made equivalent numerically? To forget entirely a man in the foreground of a picture is evidently more serious psychologically than to forget the color of his necktie. Such inequalities of importance in errors of various kinds have led some investigators, *e. g.*, Binet and Stern in their pioneer work, to assign arbitrary values to different items, *e. g.*, 2 debits for errors with prominent, and 1 debit for errors with accessory features, or a debit of 0.5 for a statement partly right and partly wrong, or for a wrong statement made with hesitancy, etc. The use of these and similar arbitrary scales of value affords, as Borst, Larguier, and others have contended, only a fictitious appearance of accuracy, without in the least ensuring real accuracy, and the arbitrarily weighted scale has, in fact, been discarded by its originators.

The psychologically best method of grading is unquestionably to classify the data statistically according to various categories — such as persons, objects, colors, sizes, etc. — and to compute range, accuracy, assurance and the other coefficients for each category separately. This will greatly increase the labor of quantitative treatment, but it will afford valuable insight into the quali-

tative conditions of report that could not otherwise be secured: the several coefficients can, for comparative purposes, be united subsequently into a single series of coefficients for the person or persons under consideration.

In general, it should be said that, despite the confessedly arbitrary character of some of these statistical coefficients, they have justified their introduction, and bid fair to furnish a valuable means for studying the psychological conditions of report, particularly of the mental attitudes of reporters.

Results.

1. *Accuracy.* — The chief single result of the *Aussage* psychology is that an errorless report is not the rule, but the exception, even when the report is made by a competent observer under favorable conditions. Thus, in 240 reports, Miss Borst found only 2 per cent. errorless narratives and 0.5 per cent errorless depositions.[1]

The average reporter, when no suggestive questions are employed, exhibits a *coefficient of accuracy* of approximately 75 per cent.

2. *Range and Accuracy.* — There is no general relation of range to accuracy, though, for a given reporter, it is doubtless true that there is an inverse relation between these two coefficients.[2]

3. *Range and Other Constants.* — There is no general parallelism between range of report and other coefficients which depend upon degree of assurance.

Table I.

Comparative Accuracy of Sworn and Unsworn Statements.

Experimenter.	Stern.		Stern.		Stern.		Borst.	
	Range.	Errors.	Range.	Errors.	Range.	Errors.	Range.	Errors.
Positive statements.....	(100)	13.6	(100)	19	(100)	23	(100)	11.0
Sworn statements.....	76	11	68	7	70	14	60	8.2
Unsworn statements.....	24	20	32	—	30	—	40	15.5
Certain statements.....							97.5	10.1
Uncertain statements...							2.5	44.0

Note. — All figures are in per cents. The results, save those of the third and fourth columns, refer to narratives, not depositions.

4. *Accuracy and Attestation.* — Generally speaking, attestation does not guarantee accuracy: on the contrary, though the number of

[1] These errorless reports are commonly characterized by very small range, *i. e.*, they are the reports of individuals who are extremely cautious and state only what they are certain of.

[2] The reason for this lack of general relation between range and accuracy is presumably that there are two kinds of good witnesses — the one possesses good capacity of observation, recall and report, and hence exhibits a large range and a high degree of accuracy; the other is cautious, and therefore restricts his range, which may be poor at best.

errors is nearly twice as great in unsworn as in sworn testimony (according to Stern, 1.82 times, according to Borst, 1.89 times as great), there still remains as high as 10 per cent. error in sworn testimony. These relations are shown clearly in the accompanying table (I.).

5. *Dependence on Sex.* — In all of Stern's work, both in narratives and depositions, with pictures, or events, or estimations of times and distances, whether under oath or not, the reports of men have been more accurate (by from 20 to 33 per cent.), though less extended, than those of women, and a similar sex difference has appeared in tests of school children. This superior accuracy of boys becomes more evident when the report is difficult to make. Stern's conclusions have, however, been criticized by both Wreschner and Miss Borst. Wreschner found that in adults women did better than men. Miss Borst likewise found women superior to men in accuracy and range, but inspection of her results shows that the superiority of women consisted in the fact that they returned a larger number of correct statements, and that the men did not make less accurate statements in their more limited reports.

More specifically, Borst found that in the narrative the range of men was 76 per cent. and in the deposition 83 per cent. of the range of women, while the accuracy of men in both forms of report was approximately 96 per cent. of the accuracy of women.

There is a similar discrepancy between Stern and Borst with regard to the tendency to attestation: the former found that men swore to 71 per cent. and women to 85 per cent. of their report, whereas the latter found that men swore to 61 per cent. and women to but 59 per cent. of their report.

6. *Dependence on Age.* — The reports of children are in every way inferior to those of adults: the range is small, the inaccuracy large, and since the assurance is high, the warranted assurance and reliability of assurance are both very low. During the ages 7 to 18 years, the range, especially the range of knowledge, increases as much as 50 per cent., but the accuracy, save in the deposition, does not increase as rapidly (20 per cent.). This development of capacity to report is not continuous, but is characterized by rapid modification at the age of puberty.

The one factor that more than any other is responsible for the poor reports of children is their excessive suggestibility, especially in the years before puberty.[1]

Stern has endeavored to analyze in part the development of the child's capacity to report, and has distinguished four stages: (1) the very young child enumerates only isolated objects or persons (Binet's enumerator type); (2) at

[1] On the general subject of children's reports, consult the work of Binet, Stern, Lobsien, Borst, and Plüschke.

about the eighth year, actions are reported more carefully ; (3) during the years 9–10, attention is for the first time paid to spatial, temporal, and causal relations ; (4) in a still later period there appears the capacity to make a qualitative analysis of the constituent features of the objects reported.

This development in the capacity to make adequate report is to be attributed to the development of new apperceptive categories or points of view from which to classify and report the several features of the original experience : in other words, the child sees and hears and reproduces what he wants to see and hear and reproduce ; he observes not so much what is placed before him as what his instincts and interests prompt him to observe, so that mental development is not so much a progress from observation to concept as from concept to observation.

The unreliability of the child in the face of suggestion indicates that the narrative is far more reliable than the deposition in the testimony of children. Jurists who have followed the progress of the psychological study of testimony are not as yet agreed upon the age at which children's testimony may be worthy of admission in legal procedure.

7. *Dependence on Intelligence.* — We have as yet no conclusive experiments upon the relation between accuracy of report and general intelligence. The work of Miss Borst indicated that in the deposition the more intelligent child surpasses the less intelligent child in all respects — especially in range, accuracy, and warranted assurance. On the other hand, the same experiments indicated that these relations are nearly all (save that for range) reversed in the narrative form of report.

8. *Defectives.* — The reports of defectives, paralytics, epileptics, the insane, etc., show, as one might expect, a very high degree of inaccuracy, even when the pathological condition is not seriously developed. Such persons are also highly suggestible (de Placzek).

9. *Dependence on Time-interval.* — Lengthening of the time-interval between experience and report exerts, as one might expect, a generally unfavorable influence, but there is nothing like the loss in efficiency shown in curves of memory for nonsense syllables, as in the familiar Ebbinghaus test : indeed, for some reporters the report seems to be somewhat improved after several days have elapsed, and, in general, the conditions are so complex as to demand further special investigation.

TABLE II.

EFFECT OF TIME-INTERVAL ON RANGE AND ACCURACY.

Form of Report.	Narrative.		Deposition.	
Intervals in Days.	3	9	3	9
Range	40.6	39.6	67.2 per cent.	65.5 per cent.
Accuracy	89.5 per cent.	87.9 per cent.	82.6 per cent.	83.4 per cent.

From his earlier tests, Stern computed a fairly constant decrease of accuracy with time, amounting, on the average, to a loss of 0.33 per cent. per day over the period of 3 weeks which he studied: similarly, Borst computed a decrease in accuracy of 0.27 per cent. per day during a period of 6 days. Some of her results are presented in Table II.

Though range and accuracy seem thus to suffer with the lapse of time, assurance, as shown by the number of certain and attested statements, is not, it seems, equally affected, but shows either a surprising constancy, or, if anything, a tendency to increase. From this it may be concluded that assurance and tendency to oath are due to the 'personal equation' of the reporter rather than to the freshness of his memory. It would follow, of course, that warranted assurance and warranted tendency to oath decline with the lapse of time.

10. *Dependence on Contents or Features.* — Not all the features of the original experience are reported with the same frequency or with the same accuracy: there is, rather, a process of selection, both in the process of observation, and also, probably, in memory and in the formulation of the report. In general, we may say that persons and their acts, objects, things, and spatial relations are reported with considerable accuracy (85–90 per cent.), whereas secondary features, especially quantities and colors, are reported with considerable inaccuracy (reports on color have an error of from 40 to 50 per cent.).

The order of frequency with which the several features are spontaneously mentioned in the narrative does not accord exactly with the order of accuracy. Thus Stern reports for the order of frequency: (1) persons, (2) actions, (3) objects, (4) spatial relations, (5) numbers, (6) qualities, (7) colors; and for order of accuracy: (1) qualities, (2) spatial relations, (3) persons, (4) objects, (5) actions, (6) colors, (7) numbers.

Miss Borst's results are: for frequency, (1) objects and persons, (2) spatial relations, (3) numbers, (4) colors, (5) qualities, (6) actions; for accuracy, (1) spatial relations, (2) objects and persons, (3) qualities, (4) actions, (5) numbers, (6) colors.

It seems probable, from Jaffa's work, that a somewhat similar order, both for frequency and for accuracy, would obtain for event-tests as for the picture-tests on which the above conclusions are based.

11. *Dependence on Form of Report.* — All authorities agree that the use of the interrogatory, whether of the complete or incomplete form, increases the range and decreases the accuracy of the report. Thus, in comparison with the narrative, the range of the interrogatory may be 50 per cent. greater, while the inaccuracy (of the incomplete interrogatory) may be as much as 550 per cent. greater. In general terms we may say that about one tenth of the narrative is inexact, but about one quarter of the deposition. Typical statistics are given in Table III.

TABLE III.

DEPENDENCE OF REPORT ON ITS FORM.

Author.	Range.		Accuracy.	
	Narrative.	Deposition.	Narrative.	Deposition.
Stern	25.5	52.1	94 per cent.	67.1 per cent.
Borst	40.5	65.6	89 per cent.	83.0 per cent.

Note. — In comparing these figures it should be remembered that Stern used an incomplete and Borst a complete interrogatory.

Gross contends that this apparent inaccuracy of testimony under interrogation does not accord with the facts of legal procedure, and argues that it merely shows that psychologists do not know how to ask questions; other jurists, however, *e. g.*, Schneickert and Heilberg, do not share this opinion. One may feel inclined to retort that if such superior ability be possessed by some judges, they at least had to acquire it by long experience, and that the browbeating of the average court lawyer does not suggest extraordinary caution in the avoidance of suggestion.

Although the interrogatory opens up a wider range of memories on the part of the reporter than does the narrative, it does not necessarily, even when seemingly exhaustive, develop the total latent memory of the original experience. For this residuum of recall the method of recognition will suggest itself, a method that has an analogue in the 'confrontation' of the legal profession. We need further information concerning the value of this recognition method for the psychology of report.

12. *Dependence on the Type of Question.* — The introduction of leading or suggestive questions very noticeably decreases the accuracy of report for children and, unless the conditions of report are quite favorable, even for adults.

In his comparison of different types of questions, Binet found 26 per cent. error for indifferent, 38 per cent. error for moderately suggestive, and 61 per cent. error for strongly suggestive questions. The greater suggestibility of children is shown by Stern's results in which the inaccuracy of boys and girls aged 7 to 14 was from 32 to 39 per cent. as against 10 per cent. inaccuracy for young men aged 16 to 19 years.

13. *Dependence on the Ideational Type of the Reporter.* — The best reports are given by observers of a mixed ideational type, *e. g.*, acoustic-motor or visual-motor (Borst): even in a picture-test, the purely visual-minded observer is inferior, though less open to suggestion (Lobsien).

A characteristic analysis of reports, for the purpose of classifying reporters into ideational types, is seen in Binet's description-of-an-object test, on the basis of which he distinguished four types of reporter — the observer, the describer, the emotionally-minded, and the erudite. Miss Borst was unable to use this classification, however, with her observers.

Another classification of reporters according to mental type was attempted by Miss Borst, who, after a preliminary tachistoscopic test, compared the reports of 'fixating' and 'fluctuating' observers, and concluded that observers whose attention is of the 'fixating' type have uniformly the greater warranted assurance of report.

14. *Hear-say vs. Eye-witness Evidence.* — When the account of a given experience is transmitted from one person to another by serial repetition ('rumor-test'), the effect is to produce, on the one hand, exaggerations (*Steigerung*), *e. g.*, verbal quarrels become fistic encounters, and on the other hand, a sort of lessened delicacy of expression (*Vergröberung*) such that what are at first mere possibilities or inferences become unqualified actualities. In general, the effect of serial transmission is similar to that of long time-interval: the range is reduced, and the accuracy, both for important and for secondary features, is greatly diminished.

Külischer reports the average accuracy of 10 eye-witnesses and of 10 hear-say reporters as follows: for the narrative, eye-witnesses, 95 per cent., hear-say reports, 79 per cent.; for the deposition, eye-witnesses, 62 per cent., hear-say reports, 54 per cent. When the reports are more difficult, the discrepancy is greater, *e. g.*, for colors, eye-witnesses have an accuracy of 46 per cent., hear-say reporters of 25 per cent., while in answering suggestive questions, the accuracy of the former was 55 per cent., of the latter only 14 per cent.

15. *Estimates of Duration and Magnitude.*— Although more work is needed here, especially upon the relation between estimates from memory and those from direct observation, the evidence is at present that, as regards duration, brief periods (up to 1–2 min.) are strongly overestimated, and that this tendency diminishes until at 5 min. it is inappreciable, while from 10 min. on there appears a slowly increasing tendency to underestimation.

As regards spatial magnitudes, Stern concludes that within a certain range of average dimensions (1–4 m., like the size of a window, height of a blackboard, etc.) estimates are fairly accurate: smaller sizes, *e. g.*, dimensions of a book, are somewhat overestimated; larger dimensions, at least up to 50 m., *e. g.*, length of a corridor, are underestimated, but a 350 m. road was generally overestimated.[1]

16. *The Effect of Repeating a Report.* — When a given reporter is called upon to make his report several times, the effect of this repe-

[1] Gross proposes by actual trial to test the accuracy of witnesses who are called upon to testify to durations or sizes. Such a plan would be more practical if we had more data upon the psychology of estimates. The writer has instituted experiments that may contribute something to this phase of the *Aussage* psychology.

tition is complex, for (1) it tends in part to establish in mind the items reported, whether they be true or false, and (2) it tends also to induce some departure in the later reports, because these are based more upon the memory of the verbal statements of the earlier reports than upon the original experience itself, *i. e.*, the later reports undergo distortion on account of the flexibility of verbal expression.[1]

17. *The Effect of Practice.* — Simple practice in reporting, even without special training or conscious effort to improve, facilitates and betters the report, as is shown in Table IV., from Miss Borst. It will be noted that the tendency to oath and warranted tendency to oath are both particularly improved by practice, and that there is also an appre-

TABLE IV.

EFFECT OF PRACTICE UPON COEFFICIENTS OF REPORT (NARRATIVE).

Number of Report (Test).	I.	II.	III.	IV.	V.
Range	39.0	39.0	42.3	40.3	42.0
Accuracy	86.6	87.7	92.9	88.2	90.0
Assurance	96.6	96.4	97.8	97.9	98.6
Warranted assurance	84.0	87.0	91.0	88.0	89.0
Reliability of assurance	87.5	89.4	92.6	89.8	90.3
Accuracy of assurance	97.0	98.0	98.4	98.6	99.2
Tendency to oath	43.0	59.8	62.8	61.9	72.1
Warranted tendency to oath	40.2	53.2	58.5	57.5	66.5
Unwarranted tendency to oath	2.8	6.6	4.3	4.4	5.6
Reliability of oath	93.0	88.8	92.5	93.0	91.7

Note. — The effect of practice in these tests is somewhat obscured by the fact that the first and third tests were made after a 3-day, the others after a 9-day interval.

ciable improvement in range, accuracy, warranted assurance, and reliability of assurance, whereas assurance and accuracy of assurance are scarcely affected. Similar practice-effects may be discerned in the deposition. From these results it is clear that the several coefficients of report may vary more or less independently.[2]

[1] It is evident that further experiment is needed here, also, for there is evidence that repetition may in some respects improve the report, at least for some reporters: most writers, however, believe that legal procedure should, in so far as possible, be arranged to reduce the number of times that witnesses are called upon to testify.

[2] There are needed, it seems to me, further experiments with careful introspective control by trained adults, so that we may secure a more adequate analysis of the factors that are affected by practice: the previous investigators have relied too much upon mere statistical evaluation, whereas the field is now ripe for an introspective analysis of the mental operations concerned in report — an analysis that should, of course, make the utmost use of the statistical method for check and control.

18. *The Educability of Report.* — The capacity of children to observe and report in a detailed and accurate manner may be improved by systematic training. This education may be best secured by appeal to zeal, interest, enthusiasm, or desire for improvement on the part of the child; more formal training of an intellectual type, *e. g.*, suggestions for systematic observation, specific training in sense-perception, instruction designed to augment appropriate apperceptive-masses, etc. — is much less effective.[1]

The inadequacy of the child's report is due not so much to poor memory as to the fact that he fails to perceive many features in the original experience, that he fails to put into words even what he does perceive, and especially to the fact that he is absurdly uncritical (his assurance, indeed, commonly reaches 100 per cent.). The education of the child in observation and report must therefore be directed in part to puncturing this bubble of unhesitating confidence and faith in his capacity to give unerring reports.[2]

Conclusion.

It has been my aim to show that in the psychology of testimony there exists an important and interesting field of psychological investigation that affords both opportunity for the theoretical psychologist to undertake in his laboratory the analytic study of individual differences, and opportunity for the applied psychologist to develop and exploit principles of great practical significance.

The 'report' arises from processes of perception, and thereby in-

[1] These conclusions are based upon Miss Borst's study of the educability of the report in the case of children aged 6 to 7 years: it may be that her pupils were too young to profit by the more intellectual training, but that this might be very serviceable for older children. In fact, Miss Borst intimates that all these methods should be combined for the best results. If, then, her results may be generalized to apply to other phases of school training than the *Aussage*, we may conclude that, in order to show improvement in a given capacity, children need (1) training in the logic of method, (2) an increase of knowledge especially in those matters that apply to the situation in question, and (3) an increase of good-will, zeal, and desire for improvement. The high degree of importance which is to be attached to the third point indicates that formal, cut-and-dried drill, in order to be effective, should be accompanied by active interest and willing coöperation on the part of the pupil. In other words, the child improves when he wants to improve and is convinced that he can improve.

[2] A witness whose testimony is poor because of this lack of judgment and proper caution may be trained by showing him how many and what kind of errors he commits, but a witness whose testimony is poor because of slips of memory is much harder to train, if indeed this defect can really be repaired at all by educative measures.

volves the whole psychology of sensation, attention, and apperception; it hinges upon retention and recall, and thereby involves the whole psychology of memory; it issues in verbal statements, and thereby involves the psychology of language and expression; it is conditioned by numerous subjective factors, such as ideational type, emotional reaction, temperamental tendencies, sentiment, susceptibility to suggestion, etc. In short, the study of the report possesses the very considerable advantage that it is the study of a coherent functional complex of processes as they appear in daily life in response to concrete situations of a familiar and frequently-recurring type, so that the feeling of abstractness, artificiality, and isolatedness that sometimes characterizes the laboratory experiment is very largely absent.

The problems of this branch of psychology are very clearly set; the methods are well developed, but there remains a great deal of work to be done, and, in this country at least, the workers are few.

Literature.

The following references do not exhaust the field of the psychology of report, but will serve as a guide to the chief sources of information.

A. The most important single source is Stern's *Beiträge zur Psychologie der Aussage*, Leipzig, 1903–6. Lack of space forbids the itemizing of the numerous titles: besides extended reviews, communications, reports of lectures, etc., this periodical contains important articles by Stern, Jaffa, Cramer, Lobsien, Lipmann, Borst, Bogdanoff, Rodenwaldt, Oppenheim, Kosog, Wendriner, Günther, Gottschalk, and others.

B. The following are other important references.[1]

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4. **A. Binet and V. Henri.** Mémoire des phrases, in *l'Année psych.*, I., 1894, 24–60.
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18. **O. Lipmann.** Die Wirkung v. Suggestivfragen, in *Zeits. f. angew. Psych.*, I., 1907–8, 44–92, 382–415, 504–546.
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PSYCHOLOGICAL LITERATURE.

THE JAMES VOLUME.

Essays Philosophical and Psychological in Honor of William James, Professor in Harvard University. By his Colleagues at Columbia University. New York, Longmans, Green, and Co., 1908. Pp. viii + 610.

It has often been remarked since the appearance of this volume that it forms a notable tribute to the distinguished scholar to whom it is inscribed. The learned world is familiar with *Festschriften* composed by companies of pupils in honor of their teachers or by groups of writers to celebrate some university festival. It is unknown, or at least uncommon, for the departmental staff of another institution, most of whose members have not been pupils of the leader whom they honor, to unite in the issue of a collective dedicatory work. Thus the members and former members of the Department of Philosophy and Psychology at Columbia have taken opportunity to express the obligation which is felt toward Professor James by scholars everywhere, they themselves the while acknowledging a debt of an especially intimate kind.

The work comprises thirteen essays classed as philosophical and six specifically devoted to psychology. This arrangement, however, is not entirely exclusive. Professor Lord's paper, 'The Abuse of Abstraction in Ethics,' for example, proceeds on a psychological analysis so comprehensive and exact that it becomes a model of what psychology can do toward grounding another science of the mental group. Professor Thorndike's 'A Pragmatic Substitute for Free Will,' on the contrary, although it is classed under the rubric of psychology, includes a considerable amount of speculative physiology and ultra-realistic theory in its 'pragmatic' escape from a fundamental philosophical problem. It is worthy of notice, moreover, that many of the distinctly philosophical papers imply a psychological basis. In particular, the idealistic-realistic group of eight with which the book begins yield abundant evidence of the writers' loyalty in this respect to the traditions of the English school. Fullerton's 'New Realism,' which is tempered more than others of the essays by recollections of idealistic days, Woodbridge's 'Perception and Epistemology,' Miller's

'Naïve Realism; What Is It?' show not only a preoccupation with the problems of perceptive consciousness which would have delighted the Fathers from Locke to Hume, and Reid, and Hamilton, but an appeal to psychological or empirical fact less usual in the epistemology of later times. Even Lovejoy's 'Kant and the English Platonists,' in its endeavor to prove the presence of Kantian doctrines in Cudworth, More, Norris and Collier, if it cannot be said to adopt the empirical point of view, starts from James's California address to 'outflank' the Königsberger. Whether such comparative neglect of the greater Germans will in the event strengthen the position, is a different question — one which is more pertinent to the aims of a philosophical than to those of a psychological review. The realistic reaction, it may be remarked, is a wholesome and encouraging factor in the present philosophical situation. It should, however, be remembered that the traditional doctrine at the end of its early course came on somewhat serious problems which of itself it proved inadequate to resolve.

A second point of interest to psychologists, and suggestive of inherited tendencies, is the relative underestimation of the significance of will in the grounding of philosophical theories. It is remarkable that a group including so many thinkers with pragmatic leanings should relatively neglect the volitional factor. There are indeed exceptions. Professor Cattell in his 'Reactions and Perceptions' emphasizes the benefits which have accrued to psychology from the recognition of the dependence of cognition and feeling on motor processes. Professor Montague in his 'Consciousness a Form of Energy' strives bravely, if unconvincingly, to solve the puzzle of the relation of consciousness to the physical world. But even Professor Dewey, though he answers with an urgent affirmative the question, 'Does Reality Possess Practical Character?' is more concerned to prove that 'knowledge makes a difference to and in things,' or that the practical character of reality 'is most efficaciously expressed in the function of intelligence' (p. 58), than to recommend the interpretation of reality in volitional terms. Does this type of pragmatism, then, issue in a reversal of a cherished first principle of the school at large? Here once more we come upon questions which transcend the limits of psychology proper. But they are suggested by various other essays of the 'Chicago-School,' as well as by those included in this volume. Does the continued accentuation of the 'practical character' of cognitive processes result simply from the conditions of the debate, or is biologico-genetic pragmatism intellectualism upside down?

The several essayists differ more widely in regard to a third problem, which belongs to the philosophy of mind, the question of the nature or even of the existence of conciousness itself. In the paper which has been already mentioned Professor Fullerton adopts positions which would be welcome to the defender of mind. Professor Strong also advocates conservative views in his acute discussion of 'Substitutionalism.' It is instructive to note, moreover, that Professor Strong believes his noëtics to be in essentials that of James, ascribing 'honor then to whom honor is due' (pp. 190–1), while Dr. Bush concludes his historical study, 'A Factor in the Genesis of Idealism' with the following words:

"When Professor James asked his epoch-making question 'Does consciousness exist?' he let in the kind of light that is often more salutary than welcome. Not less emancipating was his declared belief that consciousness is 'the faint rumor left behind by the disappearing "soul" upon the air of philosophy'" (p. 102).

Between the two extremes falls Woodbridge's relational theory, which leaves consciousness a reality, but a reality of an exceedingly tenuous and incidental kind. So the discussion leads to corollaries whose seriousness is patent and which need to be further thought through to their conclusion.

Further essays in the philosophical group are Dr. Pitkin's Socratic dialogue in defense of the face-value of perception, 'World-Pictures' (pp. 193–229); Dr. Adler's 'A Critique of Kant's Ethics,' reprinted by permission from the eleventh volume of the New Series of *Mind;* Professor Tawney's 'Purposive Consistency, the Outline of a Classification of Values' (pp. 395–423); and Dr. Brown's 'The Problem of Method in Mathematics and Philosophy' (pp. 425–458). Two of these, it will be noted, consider topics in practical rather than theoretical philosophy. Similarly the first of the distinctively psychological papers, Dr. Kate Gordon's 'Pragmatism in Æsthetics,' discusses the problem of æsthetic values from the pragmatic point of view. Dr. Wells and Dr. Naomi Norsworthy devote their essays to statistical inquiries. The former reports an extended investigation of the variability of judgment in three of its classes, æsthetic preference, color differentiation, and the comparison of weights, and tentatively concludes to 'a quantitative criterion of the subjective' (pp. 547–9). As a result of her researches, Dr. Norsworthy holds that it is possible to obtain reliable and significant numerical estimates of character (p. 567). In the remaining paper Professor Woodworth continues his valuable discussion of 'The Consciousness of Relation.' In this there is much

of essential soundness and importance. It is inspiriting to follow a 'new psychologist' as he confirms ancient and classic doctrine from the experimentalist's position. Undoubtedly 'imageless thought' is a reality, provided the terms be interpreted in strict accordance with the phenomena for whch they stand. There is, however, a subtle danger that the positive argument may itself be confused by the image assumption. In order to disprove the limitation of cognition to imagery, one may stake the issue on the existence of states which, although they be not images, shall yet be ideas of content. Hence the search for specific *feelings* of relation, a phrase which is far less happy than 'consciousness of relation,' or 'thought' taken in the classic and exclusive sense. Hence in part the tendency to overestimate the detachability of the consciousness of relation from the consciousness of the related terms, and yet to doubt the utility of the feeling (pp. 506–7). And hence, conversely, the risk that cognitive data, 'sensations' or 'qualities,' be interpreted in an atomistic fashion, as primarily separate from relating consciousness altogether. Finally along this line of reflection, the question of language gains emphatic relevancy and the substitution in the total relating experience of the linguistic symbol for the primary objective imagery. If such questions as these are raised, they must not be construed as implying any depreciation of Professor Woodworth's real achievement. Partly based on his specific discussions, partly emerging from the question at large, they only suggest that as the research under review reinforces time-honored views, so in its development and application account is to be taken of alternative conclusions which are also typical.

The book as a whole is well gotten up and printed. The frontispiece is an excellent portrait of Professor James. An index could scarcely have been expected in a work of this character, but it is to be regretted that the careful analyses of their essays which are given by most of the contributors were not printed, in English fashion, at the beginning of their papers.

A. C. Armstrong.

Wesleyan University.

MEMORY.

La définition de la mémoire. L. Dugas. Rev. phil., 1907, LXIV., 365–382.

Certain of our sensory experiences cannot be recalled because they were inadequately perceived; others are forgotten because they were not deemed worthy of remembrance. Many of them, however,

recur spontaneously or may be recalled at will. Remembering depends not upon the mere receipt of impressions, but rather upon the mental reaction of the recipient; and this reaction consists in a process of selecting, systematizing and assimilating, which results in a making-over of the incoming material. In certain instances, the subjective reaction may be slight or even lacking (as in the '*pure*' memory of Bergson); but these instances are not typical. Moreover, this passive receipt of impressions represents the lowest form of memory because material which has thus been acquired *en bloc* flits into memory and out again in a most fortuitous fashion, and is not subject to recall at will. It is only with impressions which have to some extent been organized and rendered subject to voluntary recall that true memory deals. Yet when the assimilation and synthesis is complete, when the material has acquired a permanent place in the content of mind, we have to deal not with memory but with knowledge, habit, disposition, capacity. Memory has to do exclusively with partially assimilated material: and the criterion of memory is one's consciousness that the content is a recalled datum, and that it is not a part of that indefinite whole which has been designated personality, character, or the ego. Two opposing tendencies come into play in the receipt of impressions: a tendency to inhibit the personal reaction (and to issue in knowledge), and a counter tendency to exaggerate the personal contribution (resulting in imagination). Memory results from a balancing of these opposing tendencies.

EDWINA ABBOTT.

UNIVERSITY OF ILLINOIS.

The Transfer of Improvement in Memory in School Children. W. H. WINCH. British J. of Psychol., 1908, II., 284–293.

The author has performed three series of experiments with the following question in view: "Is the improvement in memory, gained through practice in one subject of instruction, transferred to another subject which has not been practiced? For example, will children practiced in learning poetry learn another subject, such as history or geography, more readily because of their improvement through practice in learning poetry?" The experiments made by our author are less complete and less carefully controlled than those made by Professor Meumann. But they have the advantage of confirming the others on a large number of pupils — more than one hundred — and on material that is used in actual school practice.

The experiments were performed on school children selected from the classes of London girls' elementary school, from three neighbor-

hoods of different social standing. Each class was divided into two groups of approximately equal ability as to memory. This division was done "partly on an actual test, and partly on the opinion of the teacher of the class, who had a quite exceptional knowledge of the capabilities of her pupils." The tests were made by learning selected passages from a historical reader. The training consisted in committing poetry or selected passages from a geographical reader, which was not in the ordinary way accessible to the pupils. Ten minutes were allowed for memorizing. The work was mainly visual. The pupils were then required to reproduce in writing as much as they could remember. For this reproduction was allowed fifteen minutes. After such a test had been made one group of pupils spent four periods in committing to memory about one hundred words of poetry, while the others were engaged in doing sums. In marking the exercise one mark was allowed for each word rightly remembered and correctly placed. But from the total thus obtained, a mark was subtracted for every word omitted, inserted or substituted in the sentences recalled. The time allowed for each test and exercise and the method of marking were the same for all pupils tested. On the fifth morning after experimenting, each group committed a second test passage.

The results show that the girls who had the special practice averaged nearly 10 per cent. better than the girls without this training. "Improvement, gained by practice in memorizing one subject of instruction, is transferred to memory work in other subjects whose nature is certainly diverse from that in which the improvement was gained." And when the two first divisions were again grouped with regard to age and attainment, every group with special training did better than the corresponding group without this practice.

The author reserves the relation between rote-memory and substance-memory in pupils for later consideration.

PAUL R. RADOSAVLJEVICH.

NEW YORK UNIVERSITY.

Mémoire de l'orthographe. M. MÉTRAL. Arch. de psychol., 1907, VII., 152–159.

Miss Métral's experiments were suggested by the work of Schiller (1898) and of Payot (1906). Her study aimed to determine what conditions of presentation are most favorable to recall in learning to spell. The material presented consisted of groups of unfamiliar words; and the observers were nineteen girls between seven and nine years of age. Seven methods of presentation were employed:

1. The word was spelled aloud, in the usual manner, by the experimenter.

2. The word was spelled aloud, syllable by syllable, and then pronounced by the experimenter.

3. The word was spelled aloud, first by the experimenter and then by the observers.

4. Same as 3, excepting that each syllable was pronounced separately.

5. Same as 3, but preceded by a definition and explanation of the word.

6. Same as 5, but with each syllable pronounced separately.

7. The experimenter first defined the word; spelled it, syllable by syllable, and wrote it upon a black-board. Then she and the observers spelled it, syllable by syllable; then the observers traced the form of the word with the finger while again spelling it aloud.

Each series was presented twice with an interval of about three weeks intervening; and each presentation was immediately followed by three minutes' distraction. Immediately after the distraction, the records were taken by having the words written from the teacher's dictation.

The results show that the seventh method was most favorable for recall; and that the second method was least favorable. The complete seriation was as follows: Seventh, sixth, fourth, third, fifth, third, first, second. It is not surprising that the method of presentation which furnished most aids to memory should give the most successful recall; but it is remarkable that the second method should stand at the foot of the list. It would appear that syllabic spelling is of value only when done by the learner himself. The results show too that the defining of the word furnishes little or no aid in learning to spell.

Miss Métral repeated her experiments, under slightly modified conditions, with boys between the ages of seven and nine years. The former conclusions were, in the main, confirmed; but presentation syllable by syllable here proved to be more advantageous than presentation letter by letter. The author emphasizes the importance of employing methods of presentation which appeal to various sorts of imagery.

EDWINA ABBOTT.

UNIVERSITY OF ILLINOIS.

IMAGE AND PERCEPTION.

The Function of Images. W. H. WINCH. J. of Philos., etc., 1908, V., 337–352.

Winch finds that some people have few or almost no images. These persons are intellectually the equals of other people. Further, images are an actual hindrance to certain conceptual processes. Retrospect may give rise to images that are then assumed to have been a part of the earlier perceptual process. Schematic simplicity alone favors the view that images are 'cues' to movement.

Does the image function in perception? Winch cites the case of accurate perception (!) in lower animals, a case of simple sensory recognition, three instances where perception is reduced almost to an habitual reaction and one instance of a wrong perception, as argument against a sweeping affirmation to this query. Further, imagery is very slow as compared with the rapidity of perception. Experimental evidence gathered independently by Smith and Snowton, Thorndike, and the writer shows that abundant visual imagery does not aid in comparison and memory. Winch tends to extend this evidence as an argument against imagery of all kinds, though the experiments deal only with complex visual imagery.

In voluntary motion, though citing instances, *e. g.*, Professor Woodworth's article in the Garman Memorial volume, where images apparently do not appear, Winch finds "that the case is (not), as yet, closed against them." "Are Images Sensory?" The water 'looks cool'; both the appearance and the coolness are sensational. In synæsthesia the color attendant on auditory stimulus is 'better described as sensation'; the connection is due to sensory centers not yet differentiated. Actual kinæsthetic sensations constitute the great bulk of so-called kinæsthetic imagery. Much 'imagery' is really sensational in character. Winch would use 'image' where we mean image only, and retain 'idea' for 'imageless thought.'

CLARENCE S. YOAKUM.

UNIVERSITY OF TEXAS.

REPORTS.

MEETING OF EXPERIMENTAL PSYCHOLOGISTS.

The sixth annual gathering of experimental psychologists was held in the psychological laboratory of Princeton University, on April the eighth, ninth and tenth, with an attendance of twenty-three. The greater part of the time was, as usual, devoted to a consideration of

investigations going on in the different laboratories, but a few set papers were also read.

Thursday's meeting was devoted entirely to informal reports. Professor Titchener reported progress on problems continued from last year. He has found the reaction method applicable to affective processes. Miss West's study of the imagination is now nearly ready for publication. Professor Bentley is still working on the problem as to whether attention alters the intensity of the sensations attended to. His results will probably be positive, *i. e.*, when one attends one overestimates that which is attended to or underestimates that from which he is distracted. This year the Cornell laboratory as a whole is mainly devoted to a study of thought. Professor Titchener wishes to find out whether he can get transition forms between imaged and imageless thought. With this in view, investigations are going on on belief, doubt, expectation, etc. He is also trying to see whether those who claim to have imageless thought cannot find some images present. He is studying, too, memory image fluctuations, attempting to meet the difficulty of objective control.

Dr. Wells reported that the McLean Hospital laboratory has been mainly concerned with the symptom of psychomotor retardation in manic depression. In experiments with the tapping test, the retarded individual's reaction showed three differences from the normal, (1) a general slowing of the rate, (2) a tendency for the rate to increase where the normal would show a fatigue loss, and (3) a greater transference of 'warming-up effect' from one hand to the other. The measure here being finer than the ordinary clinical tests he thinks it may prove useful. He has also experimented on the electrolytic phenomena in the human body, finding indications that these phenomena are related to mental activity in much the same way as the different aspects of vasomotor and other involuntary processes that have been observed.

Mr. Woodrow reported for Columbia. Mr. Breitwieser is studying the effect on reaction of varying the resistance of the key. He finds that the simple reaction time increases as the resistance increases. He is also studying the effect of excess of pressure, distractions, and the length of interval between signal and reaction. Mr. Hollingworth is making a study of the errors in the perception of movement, of judgments of extent and time of movement, of the Loeb illusion, of the block illusion, etc., with special reference to the constant errors. He finds the indifference point where movements are neither over- nor underestimated changeable. Time and extent of movement seem inde-

pendent of each other. Messrs. Rice and Ash are working on the relation between visual acuity and the degree and color of the illumination, and the relation between both of these and the contractions of the pupils, also the effect on visual acuity of foreign lights in the field of vision. Mr. Rejall has begun a study of the comparison of the mental and physical traits of criminal boys with those of normal boys. He has found no positive results as yet.

Professor Watson, of Johns Hopkins, is continuing work on the color vision of monkeys. He has also started work on the homing instinct of pigeons. He thinks the birds may use some delicate cutaneous senses and is testing the hypotheses that the birds find their way by means of olfactory stimuli or by forming visual associations. He is also studying auditory sensitivity in blind dogs.

Professor Sanford reported that at Clark work is being done on the higher intellectual processes. One experiment has to do with the relation of attention to learning. He finds no support for the theory of unconscious help. Other experiments are : Improvements in skill in intervals of no practice, the relation of attention to the swelling out of tone of remaining tuning forks when some are stopped, and the study of mnemonic devices. Professor Porter is working on color discriminations in pigeons, quail and parrots and continuing his work on instincts and their variations in spiders.

At Johns Hopkins Dr. Dunlap is working on the reaction time to visual stimuli, attempting to see whether this can be reduced by cutting out eye-reactions, while Dr. Burrow is making a study of complications similar to the work of Klemm. Contrast effect on pitch is also being studied.

On Friday morning the reports were continued. Professor Dodge has been working on muscular fatigue. With eye-movements he found that after a number of movements which were nearly straight there would come a dip downward in the movement and then the movements would become normal again and so on. The knee-jerk he found much affected by conscious phenomena. There seemed, too, to be waves of variation of amount of knee-jerk. The quadriceps reflex he found to be shorter than the triceps, a difference which seems to be due to time of nervous transmission. Fatigue of knee-jerk is shown by abnormalities in the reflex after about twenty reflexes.

Professor Leuba demonstrated an apparatus for the study of movements of the elbow joint. Using this apparatus his experiments lead him to think that movements which are made in equal time seem equal, showing that there is a comparison of durations of some particular sensations.

Dr. Geissler, of Cornell, has been working on degrees of attention and their relation to clearness. Distractions have not proved as effective as was to be supposed. He finds that the quality of work varies with the clearness of attention as given introspectively.

On Friday afternoon Professor Hayes reported on his studies in color blindness at Mt. Holyoke. He has discovered a case of color-blindness in one eye, the other being normal, and has been trying experimentally to find how colors look to the abnormal eye by matching with colors seen by the normal eye. He found that green was in its proper place in the spectrum but unsaturated. The spectrum was shortened at the red end for the abnormal eye. He is now working upon many different phases of the problem of color-blindness.

Dr. Rogers, of Harvard, has begun work on experiments in applied psychology. He has been trying to see whether one can find psychological tests which will be helpful in determining a person's fitness for certain occupations. He finds that simple reaction time is not a test as to what a subject will do under complicated conditions. Professor Holt, continuing his work on dizziness, has found no cause of dizziness apart from eye-movements. If nystagmus is stopped by fixing the eye before it begins its quick movement, no dizziness results. Some seven or eight other experiments are being carried on in the Harvard laboratory.

Professor Bolton, in experiments on memory tests, finds that long series seem to have been remembered despite changes of order for many days during which the subject seems unconscious of what the series was. He has also been experimenting with weights.

At Yale, Professor Angier reported, Mr. Williams is studying the forms of reaction under different conditions of attention, distraction, etc. The sensory type form seems distinctly different from the motor type. In sensory reaction there is always an antagonistic reaction preceding the larger reaction, while in the motor reaction the main reaction seems already to have begun when the signal is given.

Dr. Ferree, of Bryn Mawr, read a paper giving in detail his experiments on the blind spot. He finds that complete shrinkage in the field takes place when the stimuli are on opposite edges of the blind spot, the influence of the blind spot falling off rapidly as stimuli recede from its edge and disappearing entirely one sixth of the breadth of blind spot beyond its edge. Distortion of form takes place when the figure lies within the area of shrinkage. Shrinkage is compensated for by an equivalent magnification of spatial values over the area of disturbance. Thus there is no associative filling in of the blind area. There are

zones, too, of partial and total color blindness surrounding the blind spot.

Saturday morning Dr. Ferree reported on his investigation on after-images and contrast aroused by retinal processes which do not themselves give sensations. He found that under the proper conditions he could get after-images and contrast from such retinal processes.

Mr. Clark, of Cornell, reported that he finds the effect of distraction upon the intensity of sound to be an overestimation of the sound distracted from.

Dr. Goddard, of the New Jersey Training School, at Vineland, extended to all psychologists the invitation to make use of the training school for purposes of investigation. He has been making anthropometric measurements on the relation of physical to mental development.

Mr. Woodrow presented some results of a psychophysical investigation of the effect on auditory rhythm of variations in the intensity and duration of the sounds.

Messrs. Dunlap and Vaughan, compilers of the Psychological Index, brought up the question as to the advisability of limiting the scope of this work owing to its increasing size and consequent expense. The prevailing opinion seemed to be that any such limitations would be regrettable.

On Thursday evening Professor Warren entertained the visiting psychologists at a smoker at the Nassau Club, and Friday evening at the same place another informal meeting took place.

On the invitation of Professor Watson it was decided that the next annual meeting should take place at the Johns Hopkins Laboratory.

C. L. VAUGHAN.

PRINCETON UNIVERSITY.

BOOKS RECEIVED FROM APRIL 5 TO MAY 5

Studies in Development and Learning. EDWIN A. KIRKPATRICK, editor. (Contrib. fr. Dept. of Psychol. and Child Study, Fitchburg Normal School. — Arch. of Psychol., No. 12.) New York, Science Press, 1909. Pp. vi + 101.

Essai sur la Psychologie de la main. N. VASCHIDE. (Bibl. de Philos. expér., VI.) Paris, M. Rivière, 1909. Pp. v + 504.

Mental Healing and the Emmanuel Movement; an Editorial Criticism. Philadelphia, Psychol. Clinic Press, 1909. Pp. 47.

La Morale de l'Ironie. FR. PAULHAN. Paris, Alcan, 1909. Pp. 169. 2 fr. 50.

Soziologie: Untersuchungen über die Formen der Vergesellschaftung. GEORG SIMMEL. Leipzig, Duncker & Humblot, 1908. Pp. 775. 12 Mark.

Social Organization. CHARLES HORTON COOLEY. New York, Scribner, 1909. Pp. xvii + 426. $1.50.

La Naissance de l'Intelligence. GEORGES BOHN. (Bibl. de Philos. Scient.) Paris, Flammarion, 1909. Pp. 350. 3 fr. 50.

La Fondement Psychologique de la Morale. ANDRÉ JOUSSAIN. Paris, Alcan, 1909. Pp. 144. 2 fr. 50.

Le premier éveil intellectuel de l'enfant. EDMOND CRAMAUSSEL. Paris, Alcan, 1909. Pp. 200. 2 fr. 50.

Correlation of Efficiency in Mathematics and Efficiency in Other Subjects. A Statistical Study. H. L. RIETZ and IMOGENE SHADE. University of Illinois Bulletin, Vol. VI., No. 10, 1908. Pp. 20. 35 cents.

Mental Activity from a Realist Standpoint. G. F. GOLDSBROUGH. London, Harrison & Sons, 1909. Pp. 71.

Kant. GEORGES CANTECOR. Paris, Libr. P. Delaplane (undated). Pp. 144. 90 c.

L'éducation intellectual et morale. G. COMPAYRÉ. Paris, Libr. P. Delaplane (undated). Pp. 456.

The Origin of Beauty. FELIX CLAY. London, Smith, Elder & Co., 1908. Pp. xviii + 302.

Le Mensonge. G.-L. DUPRAT. Paris, Alcan, 1909. Pp. ix + 212. 2 fr. 50.

The Psychology of Thinking. IRVING ELGAR MILLER. New York, Macmillan, 1909. Pp. xxv + 303. $1.25 *net.*

Psychotherapy. HUGO MÜNSTERBERG. New York, Moffat, Yard, 1909. Pp. xi + 401. $2.00 *net.*

A Pluralistic Universe. WILLIAM JAMES. New York, Longmans, Green, 1909. Pp. 405. $1.50 *net.*

Valuation; Its Nature and Laws. WILLIAM MARSHALL URBAN. New York, Macmillan; London, Swan Sonnenschein, 1909. Pp. xviii + 433. $2.75 *net.*

Self-Control and How to Secure It. PAUL DUBOIS; transl. by HARRY HUTCHESON BOYD. New York, Funk & Wagnalls Co., 1909. Pp. 337. $1.50 *net.*

Mental Fatigue, and its Measurement by the Æsthesiometer. A. R. ABELSON. (Thesis for Degree of Docteur-ès-Lettres, Rennes University.) Leipsic, Engelmann, 1908. Pp. 147.

NOTES AND NEWS.

By unanimous vote of its Council the American Psychological Association will hold its next meeting in Boston in affiliation with the American Association for the Advancement of Science.

The Minnesota Psychological Conference held its first annual meeting April 9, in Folwell Hall at the State University, Minneapolis. The program of the morning session was arranged in the interest of teachers and of town and city superintendents. The following papers were read and discussed: The Psychology of Moral Instruction, by Rowland Haynes; A Preliminary Study of Retarded Children, by F. E. Lurton; Psychology Applied to Education, by J. S. Gaylord. The afternoon session was devoted solely to psychology. The following papers were read: Introductory Class Work in Psychology, (*a*) Matter and Method, by J. A. Hancock; (*b*) The Use of Experiments, by J. B. Miner; Some Experimental Evidence on the Doctrine of Formal Discipline, by L. W. Kline; The Recent Discussions of Imageless Thought, by D. F. Swenson. The business of the Conference is handled by a committee of five composed of three psychologists (one from the State University, one from a college, and one from a state normal school), a city superintendent, and a teacher or high school principal.

Professor Bird T. Baldwin has been granted leave of absence from West Chester State Normal School and Swarthmore College and will pursue advanced studies at Chicago University where he also will hold a lectureship in educational psychology.

The following are taken from the press:

Professor Wilhelm Wundt, of the University of Leipzig, has been elected a foreign associate of the National Academy of Sciences, of Washington.

Dr. J. F. Messenger, professor of psychology and education in the State Normal School, Farmville, Va., has been called to the University of Vermont.

Dr. W. F. Dearborn, assistant professor of educational psychology in the University of Wisconsin, has been called to a similar position in the University of Chicago.